

**METHOD FOR THE SUSPENDED CONVEYING OF CONTAINERS AND
DEVICE FOR CARRYING OUT SAID METHOD**

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INVENTOR(S)- MULLER, Thomas Industriestrasse 6 CH-8570 Weinfelden CH
INVENTOR(S)- KUNZLER, Ernst Kreuzlingerstrasse 41 CH-8570 Weinfelden
CH

PATENT ASSIGNEE(S)- IPT Weinfelden AG (2431130) Tannenwiesenstrasse 5
8570 Weinfelden CH **DESG. COUNTRIES**- AT; BE; CH; DE; ES; FR; GB; IT; LI;
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ATTORNEY, AGENT, OR FIRM- Frei, Alexandra Sarah, (49784), Frei
Patentanwaltsburo Postfach 768, 8029 Zurich, CH

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EXEMPLARY CLAIMS- Method for the suspended conveying of containers (1), which have a base and an open or closed opening region located essentially opposite the base, it being the case that the containers (1) are received by retaining means (5) in a receiving region (U.1) into which said containers are conveyed, by a conveying force acting on the base region, as a container stream at a predetermined feed-in speed (v) and at a predetermined spacing (d) from one another, it being the case that the retaining means (5), which retain the containers (1) in the opening region, are conveyed over a conveying section (FS), and it being the case that the containers (1) are separated from the retaining means (5) in a transfer region (U.2), characterized in that, in the receiving region (U.1), the retaining means (5) are guided into the container stream between the containers (1) from above on a curved path (7'), it being the case that the curved path (7') opens out tangentially into the conveying path (8) for the containers (1) at the end of the receiving region (U.1), it being the case that, upon introduction into the container stream, the retaining means (5) initially have a speed (v') which differs from the feed-in speed (v), and are then decelerated or accelerated to the feed-in speed (v), and it being the case that the feed-in operations of the containers (1) and of the retaining means (5) are coordinated

with one another such that in each case one retaining means (5) encloses a container (1) in the opening region from behind or from the front when the retaining means (5) has reached the feed-in speed (v).

Method according to Claim 1, characterized in that the retaining means (5) are guided into the receiving region (U.1) on a path (7') which is curved towards the container stream from above, the position of the retaining means (5) relative to the curved path (7') remaining essentially unchanged.

Method according to Claim 1, characterized in that the retaining means (5) are guided into the receiving region (U.1) on a path (7') which is curved towards the container stream from above or runs essentially parallel to the container stream, individual pivoting of each retaining means (5) being superimposed with the movement of the retaining means (5) on said path in the receiving region (U.1).

Method according to Claims 1 to 3, characterized in that, at least as they are conveyed over the conveying section (FS), the retaining means (5) can be pivoted freely in the conveying direction (F) in relation to the conveying section.

Method according to one of Claims 1 to 4, characterized in that the retaining means (5) can be brought into a securing position following or during the operation for receiving the containers (1).

Method according to Claims 1 to 4, characterized in that the containers (1) can be brought into a secured position following or during the operation in which they are received by the retaining means (5) by virtue of a relative movement between the container (1) and retaining means (5).

Method according to one of Claims 1 to 6, characterized in that, in the transfer region (U.2), the containers (1) are fed to a removal means (11) which act on the base region of the containers, and in that the retaining means (5) are conveyed away from the containers (1) on an upwardly curved path.

Method according to Claim 7, characterized in that the removal means (11) has the same speed as the containers (1) conveyed into the transfer region (U.2), and in that the retaining means (5) are rotated about a vertical axis before the transfer.

Method according to Claim 7, characterized in that the removal means (11) has a greater speed than the containers (1) conveyed into the transfer region (U.2), and in that the retaining means (5) are only conveyed away upwards when the containers (1) have been removed from the enclosing grasp of the retaining means (5).

Method according to Claim 7, characterized in that the removal means (11) has the same speed as the containers (1) conveyed into the transfer region (U.2), and in that the retaining means (5) are brought into a release position for the transfer.

Method according to one of Claims 1 to 10, characterized in that, before they are conveyed into the receiving region (U.1), the containers (1) are adjusted, in which case they are brought to a feed-in speed (v) from a supply speed (v.1) and, at the same time, the spacings between them are evened out.

Method according to Claim 11, characterized in that, during the adjustment, the containers (1) are accelerated by a force acting on their opening region or are braked by a force acting on their base region.

Apparatus for the suspended conveying of containers (1), which apparatus has a plurality of retaining means (5) and a transporting means by way of which the retaining means (5) can be conveyed in an equidistant manner on a predetermined path (7') through a receiving region (U.1) and then over a conveying section (FS) to a transfer region (U.2)

and away from the transfer region (U.2), and which device, for the purpose of conveying the containers (1) on a container path (8) through the receiving region (U.1), has a container feed-in means (3) acting on the base region of the containers (1) which are to be conveyed, characterized in that the predetermined path (7') on which the retaining means (5) can be conveyed through the receiving region (U.1) runs in a curved manner from above towards the container path (8) and, at the end of the receiving region (U.1), opens out tangentially into the container path (8), in that, on the curved path, the retaining means (5) are spaced apart radially from the transporting means and/or can be pivoted in a controlled manner with respect to the transporting means in the conveying direction (F), or counter to the conveying direction, and in that the transporting means and the container feed-in means (3) can be driven at the same speed.

Apparatus according to Claim 13, characterized in that the transporting means is a transporting chain.

Apparatus according to Claim 13, characterized in that the transporting means comprises a plurality of transporting elements which can be conveyed individually.

Apparatus according to one of Claims 13 to 15, characterized in that the retaining means (5) are two-armed forks (20) which are arranged on the transporting means by way of an articulated connection (6).

Apparatus according to one of Claims 13 to 15, characterized in that the retaining means (5) are retaining grippers (40) with gripper jaws (41/42) which can be moved with respect to one another, and in that control means are provided in order to change the relative position of the gripper jaws at least in the receiving and in the transfer regions.

Apparatus according to one of Claims 13 to 17, characterized in that a container removal means (11) is provided in order to convey away the containers (1) out of the transfer region (U.2).

Apparatus according to one of Claims 13 to 18, characterized in that it additionally has adjusting means (81/82, 82') which are arranged upstream of the receiving region (U.1) and are intended for adjusting the predetermined container spacings (d) and the predetermined conveying speed (v) for conveying the containers (1) into the receiving region (U.1).

Apparatus according to Claim 19, characterized in that the adjusting means has an adjusting screw (82), which acts on the opening regions of the containers (1) which are to be conveyed in, and guides (81), the adjusting screw having a groove (84) which has a pitch which increases from the inlet region (85) of the screw (82) to the outlet region (86) of the same.

Apparatus according to Claim 19, characterized in that the adjusting means (82') has a plurality of adjusting protrusions (30) which act on the base regions of the containers (1) which are to be conveyed in and are arranged in an equidistant manner on an endless chain.

Retaining apparatus (5) having a connection (6) as part of the apparatus according to one of Claims 13 to 21, characterized in that the retaining apparatus having a connection (6) is configured as part of the apparatus, and in that the connection (6) has an articulation (71), the retaining means (5), for enclosing a container which is to be conveyed, having two arms which are arranged essentially transversely to the connection (6).

Retaining apparatus according to Claim 22, characterized in that the inner edges of the arms are designed as a securing cone (21).

Retaining apparatus according to Claim 22, characterized in that the retaining means (5)

is a retaining gripper (40) with two gripper jaws (41/42) which can be moved with respect to one another, the gripper jaws being arranged rotatably on the connection (6) and a synchronization means being provided for synchronizing the rotary movement thereof.

Retaining apparatus according to Claim 24, characterized in that the retaining gripper has a control lever (50) which is connected to the gripper jaws (41 and 42) by bolts (53 and 54), which can be moved in slots (51 and 52), and projects beyond the gripper jaws transversely to the conveying direction (F).

Retaining apparatus according to Claim 24 or 25, characterized in that a toothing arrangement (45) is provided as the synchronization means.